



Worksheet 5 Bitwise manipulation and masks

Task 1

- Figure 1 shows a byte containing a signed integer. The value of the carry bit is unknown.

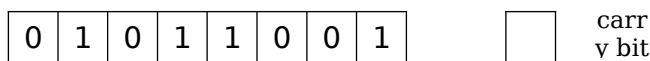


Figure 1

Show the result of performing the following shifts, starting each time with the byte given in Figure 1.

- a logical right shift:

--	--	--	--	--	--	--	--

--
- a logical left shift:

--	--	--	--	--	--	--	--

--
- an arithmetic left

--	--	--	--	--	--	--	--

--

 shift:
- an arithmetic right

--	--	--	--	--	--	--	--

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 shift:

- Using a combination of shifts and addition, multiply 13 by 6

- Figure 2 shows an 8-bit byte containing an integer.

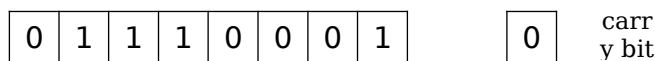


Figure 2

Show the result of performing the following **consecutive** shifts on the byte.

- a circular right shift:

--	--	--	--	--	--	--	--

--
- a circular right shift:

--	--	--	--	--	--	--	--

--
- an arithmetic left

--	--	--	--	--	--	--	--

--

 shift:

Worksheet 5 Bitwise manipulation

Data types



PG ONLINE

(d) an arithmetic right

--	--	--	--	--	--	--	--

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shift:



Task 2

4. A system has 8 switches which are controlled by a binary code. Switches 1, 4 and 8 are currently ON.
- (a) It is desired to set switch 7 to a '1' without altering the other switches. Show how this can be done with a mask and a logical operator.

Switch number	1	2	3	4	5	6	7	8
Current state	1	0	0	1	0	0	0	1

- (b) It is now desired to set bits 1 to 4 to 0 without altering bits 5 to 8. Show how this can be done with a mask and a logical operator.

Switch number	1	2	3	4	5	6	7	8
Current state	1	0	0	1	0	0	0	1

5. The ASCII codes for the numbers 0 to 9 are from 0011 0000 to 0011 1001. Using the ASCII code for "1" as an example, show how these can be translated into pure binary using an XOR mask and a logical operator.

	1	2	3	4	5	6	7	8
code for 1	0	0	1	1	0	0	0	1

Show an alternative solution using a different mask.

	1	2	3	4	5	6	7	8
code for 1	0	0	1	1	0	0	0	1